PUBLIC SERVICE COMMISSION OF WISCONSIN

Memorandum

December 23, 2014

FOR COMMISSION AGENDA

TO: The Commission

FROM: Robert D. Norcross, Division Administrator
Carol Stemrich, Assistant Administrator
Joe Fontaine, Focus on Energy Evaluation Coordinator

RE: Quadrennial Planning Process II 5-FE-100

Evaluation Work Group Recommendation to the Commission for its Approval of an Appropriate Method for Calculating Natural Gas Avoided Energy Costs Based on Long-Term Price Forecasts

Suggested Minute: The Commission (approved/approved with modifications/did not approve) the natural gas avoided energy cost calculation methodology recommended by the Evaluation Work Group.

Introduction

Focus on Energy's cost-effectiveness tests include as a benefit the avoided energy costs the program achieves by reducing the consumption of electricity and natural gas. Natural gas avoided energy costs are currently calculated based on present-day commodity and transport costs. In its September 2014 decision as part of the Focus on Energy Quadrennial Planning Process, the Commission determined that avoided costs should instead be calculated based on long-term price forecasts, consistent with the methods already used for calculating electric avoided energy costs. The Commission ordered the Evaluation Work Group (EWG) to review available sources for natural gas forecasts and recommend appropriate sources and calculation methods to the Commission.

In addition to assessing available sources for long-term price forecasts, the EWG reviewed avoided cost calculation practices in other states, consulted with Commission staff and Wisconsin utilities on applicable methods and data, and analyzed the potential impacts of different methods on existing Focus on Energy programs and measures. After considering all aspects of this review, the EWG recommends an avoided cost calculation method based on the price forecasts issued in the U.S. Energy Information Administration (EIA) Annual Energy Outlook. The recommended method adjusts the Henry Hub commodity forecast prices included in the Annual Energy Outlook, using additional EIA data, to estimate the avoided costs specific to the natural gas system in Wisconsin. The EWG recommends this approach based on its use of transparent, publicly available data that can be obtained at no cost, as well as its ability to calculate Wisconsin-specific avoided costs figures that take into account the costs from all core aspects of the state's natural gas delivery system.

Background and Criteria

For consistency with electric avoided energy cost calculation methods and Focus on Energy's lifecycle savings framework, any gas forecast used by Focus on Energy would need to forecast prices at least 20 years into the future. The EWG's review confirmed that the available sources for such long-term forecasts are the three sources Commission staff identified in its Quadrennial Planning memorandum:

1. EIA's Annual Energy Outlook, which provides price projections at the New Orleans Henry Hub through 2040;
2. Midcontinent Independent System Operator, Inc.'s (MISO), Transmission Expansion Planning (MTEP) process, which incorporates a 20-year forecast of Henry Hub prices prepared through a contract between MISO and the private firm Bentek Energy; and

3. Purchase of a price forecast from a private firm.

In order to compare those alternatives and develop a recommendation, the EWG analyzed each option against three criteria.

- **Accuracy and Detail.** A wide range of factors can affect natural gas prices. Although the accuracy of any forecast will be affected by changing conditions and unforeseeable events, forecasts that are designed to take into account more currently identifiable factors can still be considered more accurate and credible. More detailed price forecasts may also allow for appropriate adjustments to identify differences between gas prices and avoided costs. Price forecasts may not directly reflect the avoided costs to the natural gas system, in large part due to the presence of non-avoidable fixed costs in the system that cannot be fully avoided by marginal decreases in consumption. Detailed forecasts can support methods to adjust natural gas prices into avoided cost estimates, particularly by disaggregating prices based on the costs related to: (1) the commodity price of gas at the Henry Hub; (2) the transport and storage costs associated with transmitting the gas from the Henry Hub to gas providers in Wisconsin; and (3) the distribution costs incurred to deliver gas to individual customers.
- **Transparency.** Forecast results are heavily influenced by the choice of assumptions regarding future market conditions. The EWG would prefer sources that allow outside readers to verify and assess the assumptions used. Transparency can allow the EWG to more effectively assess the relative merits of different forecasts, develop methods to adjust forecasts where it believes appropriate, and analyze the causes of any differences between initial forecasts and final outcomes.

- **Cost.** In the interest of conserving program resources, the EWG would prefer sources that are free or low-cost to access.

Analysis

The EWG's review of methods in other states found that large-sale programs typically obtain their forecasted avoided costs through specialized avoided cost studies that are either commissioned from private firms, or in some cases, prepared by utility and Commission staff. These studies often include price forecasts as well as other analysis designed to estimate avoided costs specific to their jurisdiction. For example, efficiency programs throughout the New England region have used figures based on collectively commissioned studies from Synapse Energy Economics,[1] which estimate avoided costs over a 30-year time period based on a Henry Hub price forecast as well as analysis of transport, storage, and distribution systems throughout the region.

Pursuing a comparable study for Wisconsin could provide the detail appropriate to assess avoided costs as well as price forecasts, and do so through analysis specific to costs and market conditions in the state. By acting as the purchasing client, the Commission could also ensure that the assumptions and data used for the study are transparent to the Commission, Focus staff, and the EWG. However, a fully detailed study would incur additional evaluation costs. Based on its experience with cost studies in its jurisdictions, Focus on Energy's evaluation contractor estimates that a study addressing all details relevant to an avoided cost calculation would cost at least $100,000, with additional costs to be incurred for any future updates to the initial study.

[1] Reports have been issued every two years since 2007. The most recent report, Avoided Energy Supply Costs in New England: 2013 Report, was published in July 2013, and can be accessed online at http://www.synapse-energy.com/sites/default/files/SynapseReport.2013-07.AESC_.AESC-2013.13-029-Report.pdf.

The other two sources for long-term gas forecasts are publicly available for use at no additional cost to Focus. MISO's natural gas forecast comes from the same source, the MISO Transmission Expansion Plan (MTEP) reports, that Focus on Energy is using for its long-term forecasts of electric avoided energy costs. However, the forecast itself may not meet the EWG's criteria for detail and transparency. The forecast only addresses Henry Hub prices, and does not provide any of the additional detail relevant to determining avoided costs. In addition, while the forecast results are publicly available for use, it is unclear whether the private firm that prepared the forecast would be willing to share all information on its calculation that may be of interest to the EWG.

The EWG's review of the EIA's Annual Energy Outlook, and accompanying data, suggests that it may be both more transparent and more detailed than the MTEP forecast. EIA's forecast of Henry Hub prices includes expressly stated assumptions and analyzes the differences between those assumptions and the known approaches from other long-range forecasts; as a governmentally prepared estimate, further details can be pursued as needed through public inquiry. And while the Annual Energy Outlook itself only forecasts prices at the Henry Hub, the EIA also collects regional and local price information that can be used to inform more detailed calculations of avoided cost. For example, the EIA publishes historical prices at the Wisconsin City Gate, which can be compared to Henry Hub prices to identify Wisconsin-specific transport and storage costs. The EIA also documents regional retail prices, which can be compared to City Gate prices to identify distribution costs. The EWG also notes that while Commission staff's June quadrennial planning memorandum expressed concern that the EIA's projections may not have adequately accounted for recent price trends, the EIA's subsequent updates to its forecast have alleviated that concern.

EWG has concluded from its analysis that two sources could serve as an appropriate source for calculating natural gas avoided energy costs. Both sources are transparent and provide a level of detail sufficient to calculate avoided costs, while presenting a tradeoff on the criteria of detail and cost. The EIA's Annual Energy Outlook, accompanied by additional EIA data, can provide a reasonably detailed estimate at no cost; a commissioned study could provide for a more precise and detailed calculation, but would bear additional costs to Focus.

Recommendation

The EWG recommends that Focus on Energy calculate natural gas avoided energy costs for the 2015-2018 quadrennial period using the most recent long-term price forecast in the EIA's Annual Energy Outlook, supported by other EIA data that can be used to synthesize that forecast into Wisconsin-specific avoided costs. Although this approach involves a somewhat less detailed analysis than Focus on Energy could obtain by commissioning a full-scale avoided cost study, the EWG is not convinced that the benefits of that increased detail are great enough to justify the costs of such a study at this time. The EWG does also believe that this tradeoff merits ongoing monitoring, and intends to conduct a basic analysis late in the quadrennial period to assess the performance of the EIA forecast against price outcomes during the first years of the period, and identify any changes in the range of options available for long-term forecasts. This analysis can inform the EWG and Commission staff in determining whether this decision deserves to be revisited during the next quadrennial planning process.

The step-by-step forecast methodology the EWG has developed to determine the EIA-based natural gas avoided energy costs is outlined below. This recommendation is limited

to the context of Focus on Energy program evaluation, and is not intended as a recommendation for any other purposes outside of this scope without Commission consideration thereof.

1. Identify annual forecasted Henry Hub natural gas prices from the 2014 Annual Energy Outlook. The Outlook provides a stream of values through 2040.
2. To account for the additional transport and storage costs involved in conveying gas from the Henry Hub to Wisconsin, increase each forecasted Henry Hub price by the five-year average historical differential between Henry Hub prices and Wisconsin City Gate prices, both of which are published by the EIA. From 2009 through 2013, Wisconsin City Gate prices were 50 percent greater than the Henry Hub prices. In effect, this method estimates that the forecasted Wisconsin City Gate price will be 150 percent of the Henry Hub price.
3. To account for avoidable distribution costs from the City Gate to customers, adjust City Gate prices based on the five-year average historical differential between the Wisconsin City Gate prices and retail gas prices, also published by the EIA. Two key steps are involved in making this adjustment. First, separate differentials are calculated for the residential and non-residential (e.g., commercial and industrial) sectors. The EIA publishes separate historical retail prices for those sectors, and the EWG believes it is appropriate to apply those separate calculations to recognize the measurable differences in distribution costs between sectors. This approach is also consistent with the Commission's requirement for gas utilities to recover pipeline charges on a seasonal basis, since seasonal use patterns differ between residential and

non-residential customers. Second, because a significant proportion of distribution costs are fixed in the short term and cannot be avoided through marginal reductions in consumption, those full price differentials are reduced to identify only the variable costs that do remain avoidable. The EWG was unable to identify any complete data on fixed and variable distribution costs in Wisconsin; in the absence of that data, the EWG believes the avoidable cost percentages from the New England study referenced above can serve as a reasonable proxy, in part because New England's similar climate results in similar seasonal use patterns. That study estimated that 20 percent of residential distribution costs and 24 percent of non-residential distribution costs were avoidable.

This method uses a long-term price forecast as the basis for developing avoided cost estimates that discretely account for the costs of commodity price, transport, and distribution. The final calculated values, for both the residential and non-residential sectors, are shown in Table 1.

Table 1- Forecasted Avoided Costs Using EWG's Recommended Method

	Residential Avoided Cost ($/therm)	Non-Residential Avoided Cost ($/therm)
2013	$ 0.628	$ 0.588
2014	$ 0.652	$ 0.610
2015	$ 0.653	$ 0.611
2016	$ 0.722	$ 0.676
2017	$ 0.768	$ 0.719
2018	$ 0.837	$ 0.784
2019	$ 0.813	$ 0.761
2020	$ 0.763	$ 0.715
2021	$ 0.814	$ 0.762
2022	$ 0.841	$ 0.788
2023	$ 0.865	$ 0.810
2024	$ 0.893	$ 0.836
2025	$ 0.913	$ 0.855
2026	$ 0.935	$ 0.876
2027	$ 0.957	$ 0.896
2028	$ 0.976	$ 0.914
2029	$ 1.008	$ 0.943
2030	$ 1.053	$ 0.986
2031	$ 1.076	$ 1.008
2032	$ 1.109	$ 1.039
2033	$ 1.149	$ 1.076
2034	$ 1.175	$ 1.100
2035	$ 1.208	$ 1.131
2036	$ 1.253	$ 1.173
2037	$ 1.261	$ 1.180
2038	$ 1.267	$ 1.186
2039	$ 1.295	$ 1.213
2040	$ 1.335	$ 1.250

Applying this method would result in a lower total value for natural gas avoided energy costs than the figures used during the present quadrennium, which assume a present-day cost of approximately $1.00 per therm. This reduction appears consistent with the drop in natural gas prices that has occurred in the years since the current value was calculated.

Commission Alternatives

In response to the Commission's quadrennial planning order, the EWG has developed a recommended methodology for calculated avoided natural gas costs based on the most recent

long-term price forecast issued in the EIA's Annual Energy Outlook, adjusted using historical EIA data to more directly estimate Wisconsin-specific avoided costs. For the purposes of determining natural gas avoided energy costs in the Focus program, the Commission may decide to approve the EWG's recommendation, approve the recommendation with modifications, or not approve the recommendation and direct the EWG to propose a different methodology to the Commission at a future date.

Alternative One: Approve the EWG's recommendation.

Alternative Two: Approve the EWG's recommendation with modifications.

Alternative Three: Do not approve the EWG's recommendation and direct the EWG to propose a different methodology.

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